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Diagnosis of ancient oil-water contacts by instrumental techniques

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Abstract

Numerous manifestations of bituminous or so called "black sandstones" were identified in oil reservoirs of many oil fields of the Volga-Ural, Kaliningrad region and other areas, which are often associated with ancient oil-water contacts (OWC). Since the processes of natural transformation of oil in reservoirs can cover a significant volume of the deposits this makes it important for diagnostic of phenomena related to ancient OWC. The use of complex of instrumental techniques to study bituminous sandstones of the ancient OWC zones allowed us: a) to reveal transformation of minerals and inhomogeneity of hydrocarbons throughout the section of productive stratum of 15-18 meter in thick; b) to establish geological reasons and transformation mechanisms of conventional oils up to naphthides with anomalous properties; c) to demonstrate that the base of oil column serves as a collector for asphaltene precipitation from the primary heavy oil due to an influx of light crude oil in the multistage process of oil field formation; d) to estimate the time period when present-day reservoir has been filled by the light oil. The practical significance of the results obtained is discussed.

Keywords

Bitumens, Electron paramagnetic resonance, Oil reservoir, Oil-Water contact, Sandstones